MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

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[This Association as a body is not responsible for statements or opinions of any of its members.]

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QUARTERLY MEETING.

PARKER HOUSE, BOSTON, April 27, 1893.

THE meeting was called to order by the president, H. P. Wolcott, M. D., at 2.30 P. M. The record of the last meeting was read by the secretary of the Association, Dr. Woodward.

THE PRESIDENT. I am requested to call the attention of the Association to the fact that the annual dues are payable by the first of May, and that Dr. Field is ready to receive them at any time. The first item upon the programme, this afternoon, is in relation to the investigation of the epidemic of typhoid fever in Springfield, and Dr. Chapin will speak to us upon that subject.

ADDRESS OF WALTER H. CHAPIN, M. D.

MR. PRESIDENT AND GENTLEMEN: I have to speak to you, to-day, about an epidemic of typhoid fever which occurred in Springfield, in the summer of 1892.

I feel that Prof. Sedgwick, to whom is due whatever of honor there may be in determining the cause of this epidemic, could tell you the story better than I can; but he has insisted that I should lead the way, and I will do as well as I can.

Some of you may know that Springfield is a city of about

50,000 inhabitants, located in the southwestern part of the State of Massachusetts, on the line of the Boston & Albany Railroad, just beyond Worcester. The city is largely commercial and a place of residence for people doing business in the surrounding cities, commercial travellers and the like.

The business and tenement-house portion of the town is situated on a plain near the level of the river, about half a mile wide, extending up and down the river about three miles. The rest and better portion of the city is built on the high ground extending about three miles to the east of the river. The soil is sandy and the whole hill is well drained by good sewers. It was in this district that the fever appeared. We had had little typhoid since 1883. About the fourteenth day of February, 1892, I experienced some chilly sensations, and after ten days, I went to bed with a temperature of 104. I stayed in my room thirty days, partially delirious, with intestinal hemorrhages and other little things that are of interest to persons who have recovered from a typical attack of typhoid fever. At the same time, while I was at the height of my fever, a young man about sixteen years of age, living in the next house, died of typhoid fever. The milk used in the two houses was supplied by a milk dealer, who also supplied a large portion of the people in the neighborhood with milk from various farms. In June, a man died of typhoid fever in one of our best streets, in the neighborhood which is heavily dotted with red spots upon the map which is being passed around. He took milk from the same dealer. The first week in July, there was a case of typhoid fever reported, and thereafter till August first, many cases; we found that we had got to work on the matter and unearth the cause. The cases at first ran irregular courses, and we were slow in determining the extent of the epidemic because the physicians were in doubt as to the nature of the fever and would not report the cases as typhoid. A special call for reports of all kinds of continued fever finally brought abundant reports.

In the second week in July, you will notice in the other small diagram, that there were about seven cases, in the third week there were eleven, in the fourth week twenty-eight, and the last week in July and first week in August there were forty-three cases of typhoid fever which were discovered. All these cases of that date occurred in this highly-elevated portion of the town which we call the McKnight district, from certain real estate men who built the place.

The streets are broad and clean. There are no privies and no cesspools there. The streets have good glazed-pipe sewers, which have a general grade of six inches in a hundred feet, connecting with good brick trunk sewers. There were no unsightly piles of garbage and ashes about the back yards as in some portions of the town. The cases were huddled, — three or four in a family.

The attention of the board of health was called to the matter about the third week of the epidemic, when there were twenty-five of these cases developed in that week. There were a good many theories advanced to account for the trouble. Most of the people living in the district were firmly of the opinion that they caught their typhoid fever from inhaling certain noxious gases that came out of the well-holes of the sewer, and they called the attention of the board of health to the fact that those sewers were very bad. They were not the worst sewers in the town — in fact, they were pretty good sewers. The superintendent of streets assured us they were flushed at least twice a week in the night, and were kept very clean for sewers.

The teacher of science of the High School came to me, living in that district, and said he had analyzed the water in previous years, and found that his well water had deteriorated a great deal. There were more foreign substances in the water than in previous years. He was afraid that the cemetery near by was leaching its noxious material down through the sand of this district and poisoning the wells. I went with him and examined

very hastily a lot of wells. We found that all of them had some chlorides, and one or two of them had some lime; but some wells, near the cemetery, were pretty heavy with chloride, and some of them did not have any, and some of the wells that were quite a good ways from the cemetery had more than any of the rest of them. There was nothing definite about it. Besides this, in many places where typhoid fever existed, the pump which connected the house with the well was out of use and rusty, the valves dried, and evidently had not had any water in them for months. The people in the houses said they did not use well water at all. Some of them used water from a spring in the neighborhood which also had some soluble chlorides in it. Some brought their water from the Massasoit spring, out in the country, ten miles from the city. A portion of them used city water. The question was raised whether the city water was at fault, but the epidemic was sharply defined in its limits, and the great portion of the city supplied by the city water had no typhoid fever at all, or but a stray case here and there.

It was suggested that a certain man peddled milk to most of the people in this district, and a good many of them had typhoid fever. He was the dealer who supplied me with milk when I was sick. I went to him and said: "Mr. X., you are suspected of retailing typhoid fever, and I want to examine your milk-farms." "Very good," he would be glad to have me. I went with him in his carriage to the town of Suffield, Connecticut, and visited there six dairy farms. I found there nothing unusual. There had been no typhoid fever. On the street where these farms were located one farmer said they had a case ten years before. They cooled their milk in various ways, apparently pretty good ways, except one where the cans were submerged in a foul cistern; but no typhoid fever was there, and I came back to Springfield without having found any typhoid fever at all. He also showed me two farms in the town of Agawam where, he told me, he obtained his principal milk supply

for the infected portion of the town. Nothing was found there whatever. There had been no typhoid fever on either of the farms for a period of fifteen years. One farmer cooled his milk in aqueduct water and without submerging his cans, and the other cooled his in well water, also without submerging them. I asked the milkman if he had any other milk supply. He said he had taken on one farm three or four days before, and that was never examined. He said he sometimes got some milk from Feeding Hills, but he never took that milk up on to the hill; besides, Dr. So-and-So had been out there and said it was all right. "Oh," I said, "Dr. So-and-So has been out there. Did you ask him about it?" He said, "There were so many people up there that had typhoid fever that I was afraid my milk might be at fault, and I asked Dr. So-and-So to go up there and look, and he said it was all right."

I came back without having discovered anything. This was about the fourth day of August. At that time there were one hundred people sick with typhoid fever up on the hill at various places. From the fourth of August to the fifteenth of August I was unable to get any new light in this matter. I had never had any experience in hunting up the cause of an epidemic before. I did not know what else to do than I had done, and in my extremity, Prof. Sedgwick turned up one Monday morning in front of my house and asked if the board of health in Springfield wanted any help. I told him I thought they needed it some, and he said that the State Board of Health would very gladly deputize him to help us out in it, and without much more discussion of the matter we went to work. He asked me what I thought it was. I told him that I did not know; that I had examined the water and milk, and did not see what else there was. "Well," he said, "let us begin again," and we did.

We visited, one morning, about forty cases of fever in the thickest of it, and found that they had nothing in common, save only the milk. All of the forty cases we saw that morning,

took milk from the same cart except one family. That family had two cases of typhoid fever, and said they got milk of another milk peddler entirely, but after close questioning we found that about every other day they would get short of milk and go to the nearest grocery store and get milk there. We went to that grocery store and there found that the milk was supplied by Mr. X., so all the cases we knew of at that time were exposed to the liability of drinking milk from Mr. X.'s cart. Prof. Sedgwick was then very certain it was a milk epidemic, and I thought it looked like it, and we went to see what milk it was. We went to Mr. X. again and said, "We find that all these people take milk of you, and although we have not been able to discover anything wrong in your milk, yet it must be there. Now tell us again what milk you have."

"Well, I have No. 1, that is Agawam milk, the best milk I have. I have No. 8, that is from Agawam, and I have some from the Suffield dairy, but I don't take that on the hill. That goes down to the Cooley Hotel, and 68 goes from Agawam to the Blackman House."

Well, we went to Agawam again. No. 8, as I said before, had not any typhoid fever, and we went out to No. 1, and Prof. Sedgwick, in his nice way, said, "Do you have any sickness here?" "Well, we have a little boy who is sick of typhoid fever."

Prof. Sedgwick looked at me, and I wilted. I felt very tired indeed. [Laughter.] I had been there and they had not any, and then came again and they had. I did not know what to make of it. We looked at the wells and cooling-boxes and cows and buildings, and all that sort of thing, and took some samples of water and sent them to Boston, and at that time Prof. Sedgwick received a telegram announcing the death of one of his assistants, and was obliged to go back to Boston, firmly convinced that the typhoid fever came from that house. We ordered the man to cease having anything to do with the

sick person (who was his son), to take none of the milk into the house at all, to use another well entirely, and wash his own cans, bottles and instruments in a shop apart from the house, and we allowed him to go on selling his milk in that way.

The next day, that is, about the eighteenth of August, or the fifteen or sixteenth of August, I saw Dr. So-and-So on the street. I said, "What did you see when you went around with Mr. X. to look up his milk?" "Why, said he, "the house was over here, the barn was there." How many places did you go to?" "One." "Where was that?" "It was in Feeding Hills." "Didn't you go anywhere else? Didn't you go down to Suffield?" "No." "What did Mr. X. tell you?" "He said they were all getting typhoid fever on his route, and he was getting anxious about it, and those people that had typhoid fever had drank milk from Feeding Hills." "Well," said I, "what do you suppose he took me down to Suffield for?" "I don't know. I guess he must have lied."

I telephoned Prof. Sedgwick again, and down he came. We went to Feeding Hills, away out in the country. We found a very thrifty farmer who did not happen to be at home,—if you will excuse the bull. His daughter met us at the door, and in response to our questions whether there was any typhoid fever in the house said, Yes, the twenty-sixth of last February she was taken sick with bilious typhoid fever, and was sick about four weeks. I went to bed on the twenty-fourth, and she went to bed on the twenty-sixth of February. We were sick about the same time. We made ourselves sure on that point. We asked about her sickness, found who her physician and nurse were and went on with the investigation of the farm. The barn was apparently all right. The morning milking was done about five o'clock in the morning and the evening milking some time about eight o'clock in the evening. The milk was collected about eleven o'clock at night. It was cooled in a large well nearly eight feet across and perhaps fourteen feet deep, with five feet

of water. Each milking amounted to about ninety quarts, — nearly 200 quarts a day shipped from that farm. The morning's milking at five o'clock would be about ninety quarts. These cans contained ten quarts apiece and were plugged with hard-wood stoppers, maple stoppers, I suppose. They were driven in exceedingly firm, so you could not draw them out with your hands, and were as tight as could be. We first looked to see if the cans leaked, and of the nine cans we examined four leaked a considerable stream of milk around the plug. Two of them, to be more accurate, leaked a stream around the plug, one oozed around the plug, and the fourth one leaked a stream through a crack in the plug, showing that nearly fifty per cent. of the cans in the well at that time were leaky cans. The cans as they rested in the bottom of the well were about four feet under water. The morning's milk was put in there at five o'clock in the morning and remained in there until eleven o'clock at night. The evening's milk seldom went in the well, but was set in water that was pumped up, and I suppose was generally left there until the collector came at eleven o'clock and took it off.

This milk was a portion of the property of the Springfield Co-operative Milk Association, of which the farmer was a member. The members of this association all send their milk to this depot in Springfield, and it is dispensed from there. Their method is to make a contract to send all their milk to the association, and the association contract to pay for it all. Then, at the end of the month, if there is any dividend to declare, it is declared and the members are paid a certain price for their milk, the price varying from month to month, according to the dividend they can declare.

The water in this well was foul; it was milky and it was dirty. The barnyard was within eight feet, and it looked as if the drainage must go out in there. The well was covered over with plank, the two or three central planks being left loose purposely so that they could be removed and the cans let down in

the well and withdrawn at pleasure. The water was drawn from the well by a chain-pump. The spout was about a foot long, and the end of it, as in all these chain-pumps, was turned down at a right angle so the falling stream of water must go directly down on the planks. A little piece of the planks in front of the spout had been driven down and formed a trough back into the well. The stream from that pump ran all over the planks and spattered back into the well in abundance. The planks were dirty. There was loose sand upon them, and near by there was cow manure, in lumps as it had dried, showing the smooth surface pressed by a boot-sole, showing that the men had walked about there with dirty boots and distributed cow manure there, which material was washed back into the well. So it appeared that this well was dirty, and that the milk could get that water into it, and that foreign material could be brought to the well on boots.

Now, where did it come from? The testimony of the people at the house was that the excrement from the typhoid fever patient had been carried to the privy without disinfectants. I I do not know that it was disinfected at all. About the first of May the privy was cleaned out; the night soil was mixed with a considerable quantity of fresh earth, and the whole material was carried out twenty rods back of the well in question, or thirty, to a field upon which they raised tobacco. It was spread broadcast and plowed in. The field was then ridged up, and about the first of July, or latter part of June, the process of cultivating the tobacco began. Until about this time there was no call to go into this tobacco field. The crop was not ready to set and they had nothing to do with the field, but about the first of July they did begin to cultivate the tobacco, and about the fifteenth of July, we commenced to practice medicine in the city of Springfield.

Now, I want to be very certain at this point. We know that it was milk that produced this epidemic. We know it was

this milk that produced the epidemic, but we do not know that this was the way in which the poison got from the patient into the well. This is merely a theory, but we do believe that the excreta went from the bed to the privy, then to the tobacco field, and then to the well and into the milk cans. That seems to be a reasonable theory. Having got that far, we were very certain that we had discovered the cause of the epidemic, and so much so that we were ready to tell the Springfield Co-operative Milk Association the facts, which we did a very short time afterwards, but we ran up against an obstacle. We knew what the trouble was, but our milk peddler, Mr. X., said, "I don't carry that milk up there at all. I don't carry any milk into the infected districts." On the other hand, Dr. X. told me that was the milk he carried. We did not want to bring Dr. X. into it to prove that that milk did go there. We could not budge Mr. X. We got the milk inspector down there, Mr. McCaffrey. We got a discharged milk peddler, and we questioned him, and we discovered that a little of the milk did go up there. The milk peddler owned up to three cans, but he said he never peddled that milk; it always went to the grocery stores. The next thing we heard was from Mr. X. himself. I am giving this out of order, but Prof. Sedgwick will correct it, if I do. What I say is true whether the order is true or not.

Mr. X. picked me up on the street and gave me a ride down town. He was pretty pale and thoughtful. He said, "Doctor, the fact is, I lied to you." "Yes," said I, "I know that. I don't know how much, though." "Well," he said, "the fact was that I took three cans of that Feeding Hills milk up on the hill every day, and left them at the grocery stores, and that was all the milk that went up there, and I suppose that was the milk that caused the trouble. These people must evidently have gone to the grocery stores and got the milk. And (says he), there is another way that they might have got it. That is, I was accustomed to pour that milk out of the can into my delivery

can, and then pour it back into my third can, and as I carried it into the grocery store, that may have infected my delivery can, too." Well, I believed that fifteen minutes. Then I commenced to doubt again whether that was straight or not. I reasoned that the people who had the typhoid fever actually bought milk of him, and I did not see why they should go a roundabout way to the grocery store to get milk they already had, and it seemed pretty certain again that that milk must have gone up there. Well, in the meantime, Prof. Sedgwick had gone back to Boston. It accurred to me if I could find out how much milk that man bought, and where he bought it, and where he sold it, that I might be able to prove what milk went on to the hill. I am stating these points, gentlemen, to show the exceeding difficulty of arriving at an absolutely sure statement of the facts. We did not wish to go into the papers; we did not want to publish anything we could not back up with positive testimony, and long after we knew that it was this milk that caused the trouble, this No. 11 as we call it, we did not dare to say so. I went to Suffield alone. I found the farmers' account books. I copied them from the first of July to the middle of August, and came back with a record of every quart of milk that came out of the town of Suffield in Mr. X.'s cart. I stopped at three farms in Agawam, and I got the record of every quart of milk he had obtained there. I went to the Co-operative Milk Association, and I found every quart of milk that had come from the Feeding Hills farm in the same way, and I then had all the milk he obtained. The question was, How did he distribute it? He had the Blackman House, he had Cooley's Hotel and some minor hotels.

I went to the first one. "What time in the morning do you get your milk?" "Well," he says, "we got through with X. last week, and the reason we got through is, he came so early, — two o'clock in the morning. That is too early to wake anybody up to get milk. He always came at that time, never any later

than that, — sometimes at half-past one." "Are you sure about that?" "Yes." I put that down then as certain, that the Blackman House took nearly one hundred quarts of milk at half-past one in the morning.

When I got hold of the milk peddler, I said, "What time does the team come in from Suffield and Agawam? "That comes in at one o'clock." Well, that agreed pretty well. "How is it distributed?" "Well, X. loads up his cart and the other peddler loads up his cart, and X comes up and does the wholesale work, and the other peddler goes down to the lower part of the town and does his retail work."

Mr. X. was running two milk carts. There was no typhoid fever on this cart No. 2. Then I had traced the fact that Suffield and Agawam milk came in at one o'clock, and some of it was dropped off at the Blackman House from half-past one to two o'clock. I went to the Cooley House and got their account of how much they had from day to day. They got their milk about three o'clock in the morning, but they were not sure. "Was it as late as five?" "Never, never as late as five; probably never later than four, anyway." I found out that he had some other minor dealings in that part of the town, and then back I went to the association. "Now, what time does Mr X. get here?" "Well, he loads up here about five o'clock." "What does he get?" "Well, he gets milk from Agawam, and that we bring in to him." "Does he always take all of that milk?" "He does." "Then what does he do?" "He fills up his cart with our milk." "Does he bring any milk here?" "Well, sometimes he brings two or three cans, — not much." "How much does he buy of you?" "Well, I guess the bookkeeper can tell you." So we went to the bookkeeper, and we got his daily tickets showing precisely how many quarts of milk he got. Now, those tickets had four or five numbers on them, 120, 160, 140, 10. "What do all these numbers mean?" "Why, the big number, 160 quarts, 140 quarts, is the milk Mr.

X. loads out on his own cart at five o'clock in the morning" "Does he get it all in the morning?" "Yes." "What milk is it? "It is milk produced out in Feeding Hills." "No. 11?" "Yes." "How do you know he always got No. 11?" "Well, when a milk peddler is satisfied with the dairy he takes it right along. If there is any left, anybody else can have it, but until he has loaded that milk, it is his." Then I went on with the process of subtraction and found out that the Agawam milk and the Suffield milk was wholesaled to two large hotels, and besides that loaded up another retail cart with 280 to 300 quarts of milk and was sold at retail to another portion of the town. That disposed of the Suffield milk and Agawam milk, with the exception of thirty or forty quarts, which corresponded to the statement of the association people that X. brought there every morning about three or four cans of milk on his own cart before he loaded up. Then we were in condition to see that Mr. X. distributed three or four cans of Agawam or Suffield milk, the entire product of one farm in Agawam (about one hundred quarts), and the milk from Feeding Hills (three dairies), two of which had no typhoid fever upon them, and one of which had typhoid fever upon it We had Dr. So-and-So's statement that Mr. X. had told him he had given people milk from the farm in Feeding Hills.

We told the people at the Association on the first day of September this story, and they listened to it with some surprise, and without any equivocation or hesitation said, "You are certainly right, and what shall we do?" "Why, stop soaking that milk in that well," and that was the last day in which the milk was submerged in the well. The typhoid fever was prevailing at that time, and fourteen days later we were practically having no new cases, and from that day until this there has no typhoid fever appeared in the district where these cases occurred, in

Ward 5, which is the ward covered by this epidemic. There were during July and August and a portion of September 103 cases of typhoid fever. 101 of them had access to this milk, and two of them, probably not. You will see on this map that down in the tenement-house portion of the town there are two little spatters of red dots. Our attention was called to that, and we put Mr. McCaffrey, the State milk inspector, immediately upon the route of the man who supplied those houses with milk, telling him to observe the check-mark on the plugs of the cans. He came back and reported to us wherever there was typhoid fever and the man carried in milk, the plug mark was "11." That was the Feeding Hill's number. There we had positive evidence that the supposed infected milk did go to families having typhoid fever. Beyond these cases there was a slight epidemic the sixth of August, concerning which I have no time to speak. It was probably the same milk, or could have been the same milk, and other than that there was no typhoid fever, except imported typhoid fever, which could be plainly shown to be imported typhoid fever. Verily, gentlemen, a little eleven leavened the whole lump. [Applause.]

THE PRESIDENT. Prof. Sedgwick has kindly volunteered to add an account of his very important share in this investigation.

ADDRESS OF PROF. W. T. SEDGWICK.

MR. PRESIDENT AND GENTLEMEN: I do not know that I can add very much to what Dr. Chapin has told you. I only regret that he is obliged to take his train and leave us so soon, for the excellent work that he did, particularly in tracing out and proving the whereabouts of the milk from different dairies, was a work requiring days of labor, and deserving high commendation.

From the moment that we found forty-six cases, forty-four of whom had had milk from one man, we were satisfied that milk must be the cause of the epidemic. As he has told you, the water supplies were different; the privy relations and sewer relations and so on, if they could be supposed to have anything to do with such an epidemic, were so different that there was no common bond between the people involved. It became thoroughly monotonous going from house to house to learn where the milk came from. We could see the words forming on the mouth of the people before they actually came out in answer to the question, "Who is your milkman?" and it got so that we could hardly ask that question without having it appear that we expected "X." to be answered. We devised all kinds of ways of varying the questions, asking for example, "Where do you get your butter?" and listened patiently while we also heard where they got their vegetables. "Well, what water do you use?" "Ludlow" or something of that sort, and by-and-by we would innocently ask, "Where do you get your milk?" The answer was always and invariably the same. From that time we never doubted that the cause of the trouble was in the milk; of course we could not doubt it; but then began the most difficult part of the investigation. The milkman denied positively that he had left any milk there which came from an objectionable source, and we were very near being led into error by the discovery of the boy sick with typhoid in the house in Agawam from which the milkman alleged that the milk of this district had come.

The milkman's plan seems to have been this: He said, "I will send these people to a place where I know that everything is right," so he sent us to the Agawam farms, admirable farms, and it must have been to his horror and surprise that we found there a case of typhoid fever. It had developed later and, as it turned out, it was probably a Springfield case. The boy had been to Springfield just two

weeks before he was taken, and instead of having been the cause of the epidemic he was undoubtedly a sharer in it. In my judgment at any rate, that fact was evident, and I spent, I should think, altogether three or four hours in carefully questioning the members of that family so as to see if I could find any way by which the typhoid got into that house. It was a good, clean, Yankee family, and I asked them if anybody had stopped there to use their privy, which was not far from the well. "No, nothing of the kind." "Have you had any company who could possibly have brought the disease here? "No, nothing of the kind." "Well, when was the boy taken?" "He went up to the city at such a time," the time agreeing perfectly with the Springfield cases. There was the sick boy, however, on the milk farm which was said to provide the milk for the district infected, and it seemed as if it was an arrangement for deceiving us. I took samples from the well for bacterial analysis and chemical, and it seemed to be no worse than ordinary wells; bacterially it was very good indeed. There was good filling between the privy and well, so that I was skeptical with regard to the well having been the cause, and yet knowing that it was a milk epidemic; the milkman apparently telling the truth, and seeing this milk that had gone to the people on the hill, I worked about as hard as a man ever worked, and Dr. Chapin did too, to prove that that boy had given those people typhoid fever. At the same time we could not bring it about, and we were feeling very much chagrined when the new line of evidence came up. It only shows how hard it is to fight the truth if you give the truth a fair chance.

We were immensely helped when Dr. "X" told Dr. Chapin that he had been to this farm, because then the question arose, and remained, Why had he been there?

Throughout the whole investigation the Springfield Cooperative Milk Association acted nobly. They gave us full access to their books; they helped us in many little

ways, telling us just how the milk was handled. We had to study the whole system of numbers, to know what No. 68 meant, and where it went, and who produced it, and what sort of a farm it came from, and so on. No. 68, by the way, was one of the points on which we were at first very much deceived. On his first ride to Agawam, Dr. Chapin was told that No. 68 went to the Blackman House, which was the truth. On his second investigation he was told that all the milk from Roberts' farm went to the Blackman House. We went and got the milk tickets of the Blackman House and with the aid of the Co-operative Milk Association, proved that not a drop of No. 11 went there. That was one of our first steps. So it was all through, a series of provings and disprovings, until we did arrive finally, I believe, at the complete truth, excepting as to that one point, how the milk got infected. We do not claim that there we had absolute proof. In fact, we admit freely that we had not, but this much we are sure of: This was a milk epidemic; moreover, it was caused by milk produced on the milk farm of Byron C. Roberts; and as the cans were submerged in a well, there were various ways by which the milk could have been infected. We know that the men went from the tobacco field to the well with their dirty boots and carried dung on their boots, leaving it on top of the well. A portion of human excrement containing typhoid germs might in this way easily have fallen into the well and got into the milk. Whether it did or did not do so, we do not know. This farmer was changing his hired men continually. There had been a whole succession of them. Some had left for uncertain reasons; some of them may have had early cases of typhoid. We do not know. If they did, it is easy enough to see how they may have contaminated the milk. The fact remains that it was unquestionably a milk epidemic, and due to that particular milk.

This is one of those cases where it would be very easy,

of course, to go wrong, but I think I have said enough in connection with what Dr. Chapin has said, to make it clear that we have finally arrived at a good measure of the truth. You may ask about the bacterial analysis of the wells. At the time I was very much disappointed. The bacterial analysis of the well on the farm where the boy was sick did not show any typhoid bacteria, and I felt at the time very much disappointed, because I then hoped to bring that case into causal connection with the Springfield cases, but afterwards when it turned out that this case did not have anything to do with the epidemic, I was relieved. The natural conclusion from such facts is that it is entirely safe to let the truth alone and to follow strictly scientific principles, without trying to twist the evidence in any way.

It only remains to say that in all there were twenty-five persons killed and one hundred and twenty-five more, severely wounded in this epidemic. If anything of the sort had happened as a result of the Homestead riot, or from a broken bridge, the whole country would have been stirred over the terrible calamity, but as it was "only" a typhoid fever epidemic, only an "accident," very little was said, very little was thought. The dead were buried, the rest recovered and are going about their work; and most wonderful of all, people are going on taking milk as before from the same man.

THE PRESIDENT. Of course, this is by no means a single experience in the history of Massachusetts. There must be a good deal of information in the mind of almost every man here, after such an account as this, which would explain, or at any rate, give occasion for questions with regard to the occurrence of it; and it must be that somebody here can add something to this discussion, or that some question may be asked that would be of service. I have no doubt that Prof. Sedgwick would be willing to answer any inquiry that may be put to him.

DR. DAVENPORT. I would like to ask whether this well

was in use at all for any other purpose than cooling milk?

PROF. SEDGWICK. Only for submerging the cans. It was not a house well. It was a well at the barn.

DR. DAVENPORT. How was it in regard to washing cans and utensils?

PROF. SEDGWICK. The milk pails were washed in a very good stream of water from the mountain. We went into all that very carefully.

DR. DAVENPORT. This water was used only for cooling?

PROF. SEDGWICK. Only for cooling.

DR. DAVENPORT. And this was the barn well?

PROF. SEDGWICK. Yes. It was not the well in the barn, but the other side of the barnyard.

DR. DAVENPORT. Did they use any cooler?

PROF. SEDGWICK. That was the trouble; the man was using the well to avoid the cost of a cooler.

DR. DAVENPORT. Were the cans completely full of milk?

PROF. SEDGWICK. It was alleged that they were always completely filled. After we had been to the farm we met the farmer coming home and asked him if he always filled the cans full, we having just found that they were not filled, not one of them. He said that they were always completely filled. As a matter of fact, the cans were not full. On shaking a little we could hear the milk swashing around inside every can. We opened some of them and found that they were perhaps five-sixths full. There was a chain-pump which washed things back into the well, owing to the poor curb. We saw no reason to suspect that the water went directly into the milk intentionally, although a certain servant whom we followed up, a person who had been there and had left, and would be likely to be full of gossip, told us that it did not infrequently so go in.

DR. DAVENPORT. So the water of the barn well would be most likely to be used for cleansing or rinsing the vessels, if any such water was used?

PROF. SEDGWICK. I do not think so in this case, because

it was at a little distance from the house. They would have to pump the water, whereas they had near the house running water from the mountain, which, of course, would be easier to get for washing purposes than the pump water, and I am inclined to think that the milking utensils were regularly washed in that mountain water.

Dr. Woodward. Did the same man that cultivated the tobacco, milk the cows?

Prof. Sedgwick. Yes. To return to the water, I may say that it was the water from the mountain that was used for washing dishes and cans, not for drinking. For drinking, the family had another (third) supply from which they got their water by means of a little tin pail, and we found no reason whatever to suspect that that was contaminated. Its situation was such it could not well have been contaminated. It may be said, also, that there was some question about the diagnosis of the cases of typhoid fever in the farmer's family, but this matter was settled very nicely, as it turned out, by the fact that the attending physician had certified to an opinion given at that time that the principal case was one of bilious typhoid fever. I think if it had not been for that certificate the attempt might have been to deny altogether that it was typhoid. That certificate was on file in an insurance office, and it served a very good purpose.

Dr. Abbott. There is one point worth mentioning, perhaps, which relates to the milkman himself. We have had several of these milk epidemies within the past few years, and the people generally are becoming a little more enlightened in the matter, and begin to express their opinions after a serious epidemic has got under way. But the point in regard to milkmen is this: that human nature enters into this question. The milkman will, if he can, look out for his own interest, and not only that, but he will mislead and do his best to draw your attention in another direction. I remember just such a case in Waltham some three or four years ago, where an epidemic occurred upon a certain milk-

man's route who sold milk in the Nonantum district in Newton, and also in Watertown. Several cases occurred upon his route, and upon his route alone. There was no other case in the neighborhood at that time. I went out there and visited his farm and found there a very neat dairy, everything very nice about it in every way; in good condition, new barn, new stable, and a well which had just been put in. But he had not dug his well deep enough, and the well gave out. He had gone to a neighboring house, a distance of perhaps twenty or thirty rods, for water. I went over to that house and found that there had been three or four cases of typhoid fever and one death there, and the water he used was taken from that house, he said, not the water for washing his cans, but simply the water for watering his cows, but I am inclined to think that his statement was incorrect. He was disturbed at the matter, because it had interfered with his business. His business was for the time being completely stopped in that section of Newton. The people stopped taking milk of him, and, of course, threw it all back upon his hands. He threatened to sue some one, and he came to see me about it. He did not seem to know whom to sue, but I am inclined to think he wanted to sue the Newton Board of Health. That is how it acts. Sometimes the business stops itself, for people will stop taking milk as soon as they learn the true cause of the epidemic. In this case the real cause undoubtedly existed in the well from which he took the water, which was within a very few feet of the barn cellar, and in such a locality that the filth from the barn cellar could have got into the well, and my opinion was that the excreta of the typhoid patient was disposed of in that cellar. I could not prove that, but that was my opinion at the time. I think deception is the rule, if you come across a milkman who is not unusually honest. He will not only do nothing to help you, but he will do all he can in his power to mislead you.

Dr. Woodward. In this connection I can report a case of typhoid epidemic that came under my notice some ten years ago, in a small hotel. The Black Mountain House was situated in Campton, New Hampshire, and in August had 130 guests. A child from a Massachusetts city, the daughter of a physician, by the way, had had a mild case of typhoid fever, and in the second or third week of the disease was sent up to this hotel with her mother, to get well. Ten days after the arrival of the child at the hotel, thirty of the guests came down with typhoid fever, and two of them died. Up to that time, so far as I can learn from the records of Campton, there had been no typhoid for years. The old country doctor who had been practising there nearly thirty years, had practically never seen a case of typhoid. Milk was supplied from a farm owned by the proprietor of the hotel, some two or three miles distant. The water came from a mountain in that town through half a mile of wooden pipes, but the privy consisted of simply the seat and underneath that a plank trough, which was dumped in a field every two or three days. Just how the guests of the hotel were contaminated I was unable to make out, but the fact was that ten days after this child came to the hotel, thirty of the guests were stricken with the disease and two of them died.

Now, this whole matter of handling typhoid in our cities, I think, is an exceedingly difficult one, and I will state briefly our system in Worcester. We have included typhoid fever among the diseases to be reported by the physicians, and our physicians are usually very good indeed about reporting them. Whenever we get a report or hear of a case of bilious fever or typho-malarial fever, or hear of any of that whole list of diseases, we always investigate, and in the majority of instances it proves to be typhoid. In investigating cases our inspectors have a printed card which they are obliged to fill out in every case. That card requires them to fill out the name, residence, etc., of the

person affected; the owner of the house; the water supply; whether connected with the sewer or not; whether there is a well on the premises or not, and the milkman; and whenever we find two or three cases of typhoid arising on the route of a single milkman, we always look at his farm. So far we have never had an epidemic of typhoid in Worcester that we could trace to any source. Last year we had something like fifty cases of typhoid. A number of them we know were imported from Milford, where they had an epidemic. A very large number out of the fifty were patients in our City Hospital who were brought in from the outlying towns. I think it is exceedingly important to require that typhoid fever be reported, and in Worcester we have had no difficulty in getting physicians to report the same as they report either diphtheria or scarlet fever.

Dr. Fox. About the water supply in Black Mountain, where did that come from?

Dr. Woodward. The water came from the mountain about half or three-quarters of a mile from the hotel.

Dr. Fox. Was that the only water used?

Dr. Woodward. That was the only water used.

Dr. Fox. I think I can correct you a little on that. I was one of the victims. [Laughter.] I had a severe attack myself. My whole family, five of us, all were victims. When the child came there she had not been sick. She had been feeling badly for a day or two, and came there and was taken sick. But as to the water, a part of it came from a well below the hotel. I was never able to investigate this, but I wondered if the excreta could get into the well. The well was below and in front of the hotel, and the water was brought to the hotel every day; I cannot say what it was used for.

The President. If there is nothing else to be said upon this interesting subject, I would like, before we proceed to the next business of the afternoon, to ask the Association

to act upon the name of one gentleman, omitted when the report of the Committee was made.

The name of Dr. J. S. Sanborn was then proposed for membership in the Association, and he was unanimously elected.

THE PRESIDENT. The next business on our programme is the report of Dr. Abbott.

BOSTON, April 27, 1893.

To the Massachusetts Association of Boards of Health:

GENTLEMEN,—At the last meeting of this Association a committee was appointed to report upon such questions as might be referred to them, relative to the subject of mortality statistics, and as a special duty assigned to them, the following topic was suggested: "A Uniform Method for Estimating the Populations of Cities and Towns in Intercensal Years."

The primary importance of the subject of vital statistics to boards of health is recognized in the following language by one of the foremost of American sanitary authorities: "My observation of the progress of public health work in this and other countries for the past twenty years, leads me to believe that this progress, in any locality for any considerable length of time, depends upon the completeness of its vital statistics, and the use that is made of them." (Dr. J. S. Billings, in *Transactions of American Public Health Asssociation.*)

A better text could scarcely be found as an introduction to thorough and careful work in this direction.

Since all correct deductions relative to mortality rates must depend for their accuracy upon the number of the population, with which the number of deaths is compared, and since we only know the number of the population in the census years, it is important that we should adopt some uniform method for estimating the population in the years intervening between the taking of the census.

Your committee has examined the different methods employed for this purpose, and has also obtained the advice of eminent authority upon the subject (Dr. J. S. Billings), and unanimously recommends that the Association should adopt the rule which was advised by Dr. Wm. Farr for the estimation of the population of England in intercensal years, and that is, that the known rate of increase of an intercensal period shall be applied to each following year in which the rate is not known. They also recommend that this method be applied to cities which had a population by the last census of more than 30,000 inhabitants, and that for smaller places the rule to be adopted of adding for each succeeding year one-fifth of the difference between the last state and national census.

By the term "rate of increase" in Dr. Farr's rule, the geometric rate is always intended. It has been a common custom to estimate the increase of population as constant for a term of years; by this method the increase between 1890 and 1891 would be the same as that between 1894 and 1895. Such, however, is not a natural method; the increase in a city of 100,000 increasing 2 per cent. annually should be greater when that city has arrived at the year 1894 than when it began the five-year period in 1890.

The error of estimating by an arithmetic rate is similar to the assumption that simple interest and compound interest will produce identical results.

We would also recommend that, for the obtaining of rates of increase of previous periods, short terms be employed instead of long terms, *i. e.*, five-year periods instead of ten or twenty-year periods. In this respect we have an advantage over England where the census is taken only once in ten years.

We are aware that no method of computation will produce perfect results, especially in a country where the increase from immigration is constantly greater than the natural increase resulting from the excess of births over

deaths. Estimates of the population of England for the last year of the intercensal period differed by more than a half a million, or about two per cent. of the population, as estimated for the same year after the census had been taken. That of Massachusetts by 75,715, or 3.5 per cent. after four years, but in either case the estimates were nearer the truth than any estimates which were based upon such uncertain data as the assessed polls, school children, number of names in the city directory, etc. Let us now apply the two methods, the arithmetic and the geometric, to a given instance, taking as an example a city of 400,000 inhabitants in 1885 which has increased between the two censuses of 1885 and 1890, from 400,000 to 450,000. What is the rate of increase under each method, what is the population of each year under each method, and what should be the population of 1891 under each method?

The figures may be stated as follows:

Years.	Population Arith. rate.	Population by Geometric rate.	Difference.
1885	400,000	400,000	0
1886	410,000	409,534	466
1887	420,000	419,296	704
1888	430,000	429,291	709
1889	440,000	439,524	476
1890	450,000	450,000	0
	Arithmetic rate of increase. 2.5 per cent.	Geometric rate of increase. 2.3836 per cent.	
1891	. . .	460,726	. .

By these two methods the rate of increase of Boston for the period 1885–1890 was as follows:

Arithmetic rate, 2.976 per cent.
Geometric rate, 2.813 per cent.

and the estimated populations for the next five years would stand as follows:

Years.	Est. Pop. by Arith. rate.	Est. Pop. by Geomet. rate.	Difference.
1890	448,477	448,477	0
1891	461,823	461,092	731
1892	475,168	474,062	1106
1893	488,513	487,397	1116
1894	501,858	501,107	751
1895	515,203	515,203	0

The rates of increase (annual) for the twelve largest cities of Massachusetts, together with the estimated population for the present year are as follows:

Cities.	Rates of increase. Geometric.	Estimated population. 1893.
Boston,	.02813	487,397
Worcester,	.0436	96,217
Lowell,	.0392	87,191
Fall River,	.0552	87,411
Cambridge,	.03258	77,100
Lynn,	.03973	62,636
Lawrence,	.02817	48,535
Springfield,	.0329	48,684
New Bedford,	.0405	45,886
Somerville,	.0602	47,850
Holyoke,	.0502	. . .
Salem,	.0186	. . .

We recognize that there must be exceptional instances of phenomenal growth of cities and towns, and occasional instances in which local conditions may lead to a marked change in the rate of increase in a single year, and sometimes a decrease may occur, as in the city of Lawrence in the interval between the censuses of 1880 and 1885. For all such cases due allowance should be made. We therefore consider the subject of sufficient importance for the appointment of a standing committee to which such cases should be referred for adjustment.

S. W. Abbott,
E. Farnham,
W. H. Chapin.

Dr. Field. I should like to ask Dr. Abbott if he estimates the increase of the population of cities in January or in May?

Dr. Abbott. The census was taken about the middle of the year, May or June, and the estimates are for that time in the year. Of course, at the beginning of the year the population would be somewhat less and at the close somewhat greater, so that the mid-year time may be considered an average. In England the census is taken, I think,

very quickly, perhaps in one week or a few days' time in the month of April, and in order to get the mid-year population there they always rate ahead three months at the same rate.

Dr. Fox. I was wondering if you made your estimate there as compound interest is reckoned?

Dr. Abbottt. No; only once a year.

Mr. Newcomb. In Salem our city clerk acts as a registrar. So far as typhoid fever is concerned, this year we have been fortunate. There was a slight appearance of it in the winter, and at the meeting in January, I was very much interested in the statement made about ferreting out this disease through milk, as mentioned by Prof. Sedgwick. Our condition at present is remarkably good. I think we have only one typhoid case (and that not a severe one) in our hospital. We have but one case of scarlet fever and one of diphtheria, which I think is a pretty good condition for a city of 31,000 inhabitants.

The President. I should like to call the attention of the Association to one matter which troubled somewhat the committee of arrangements, and that is the absence of a general interest on the part of the members of the Association, not in the discussion, not in their presence at the meeting, but in the preparation of the business of the meeting — that is, subjects for discussion. I think the Association does what generally happens where an Association has a very able committee,— they are very much inclined to leave the whole work of the Association to the committee. Now, Dr. Durgin has certainly, with his committee, provided the Association with a most excellent programme, but there must be in almost every city or town in the Commonwealth some topic of very distinct interest which would also interest the boards of health of other cities and towns, and I think it is very desirable that those peculiar topics should be brought to the attention of our Association, and should be made matters of discussion.

To mention one fact, it may be known that very important public works have been undertaken, or are now being undertaken in regard to the disposal of sewage matter. The city of Brockton is entering upon a very important experiment in that direction. I think that questions of that sort in which a community is directly interested can be brought up, and that they would be matters of very great interest to the Association. They might be brought before it for discussion with some simple presentation on the part of the local board of health, suggesting the questions to which they desire to call attention; and I desire to say that the committee having that matter in charge would welcome any suggestions from the various members of the local boards.

Dr. Durgin. I do not know that I ought to say anything in this connection, but the President has alluded to a subject to which I might add one word, and that is, the preparation for our meetings. Judging from past experiences, there seems to be a hesitancy about asking the Association to meet in the several cities and towns and in offering papers and subjects for discussion, with members so widely scattered.

It sometimes happens that we do not know where we are to meet or what papers we shall have, until a few days before regulation time for the meeting, and then it requires great activity to get things in order for the meeting. I would suggest that all invitations to meet in places, be given at the last preceding meeting, and that all members use the utmost freedom in offering papers and subjects for discussion. It will aid the committee very much, indeed. I want to say also, in regard to our publications, when any member of the Association does not receive his copy, if he will send word to me, I will see that he has it. We need a corrected list of members every three months and each one should see that his name is correctly enrolled on the Secretary's list.

DR. DAVENPORT. Mr. Chairman, if there is no subject before the meeting, I should like to inquire how general the practice is of reporting cases of whooping cough in towns and cities, and if they are reported, whether it seems desirable, that they be reported to school committees, or anything done to prevent the spread of the contagion.

DR. WOODWARD. I can answer that for Worcester. In some contagious diseases, as diphtheria, scarlet fever, typhoid fever and measles, we require a report from physicians. Other diseases such as chicken-pox, mumps, whooping cough, etc., we simply notify the schools to exclude the children so long as the symptoms remain, and we do not require a certificate of recovery on return. The reason that we do not is that we have made a total failure in trying to do anything with measles, and we hesitate to make the attempt with any other disease.

DR. DURGIN. We have very few cases of death from whooping cough, and I do not believe that we could enforce a regulation requiring whooping cough to be reported. We have in times of epidemic successfully enforced requests to report measles, but where there are a few cases of measles I am afraid the doctors won't report them very promptly.

THE PRESIDENT. There is one subject that is of very great interest, certainly so far as the records of the State Boards of Health show, and it is a matter of very great importance. I scarcely know when a subject makes more trouble for the local board of health, and the question has been given to me in this form: Under what circumstances is it advisable to close a school in consequence of an epidemic? And is it advisable to exclude particular scholars from that school? That is a question that certainly must arise in about every community in this State, and when it does arise I can testify that there is nothing that produces more trouble. I would suggest that it is a very desirable thing for the Association to appoint a committee to consider the subject and report to the next meeting of the

Association. It will then be understood that we shall have something for discussion.

DR. DURGIN. I move that the chair be authorized to appoint a committee of three for the purpose which has been stated, and that the committee report at the next meeting.

(The motion of Dr. Durgin was seconded and adopted.)

DR. FARNHAM. Has the local board any power to close the schools?

DR. DURGIN. I do not know, but I am under the impression they have no authority to close the school. Advice, however, is frequently asked, and whatever the board of health advises is usually done by the school committee without hesitation.

DR. FARNHAM. That very request has been made to me this morning by the superintendent of schools, and all I could say was I thought the local board of health had no authority to close the schools.

DR. FIELD. I am inclined to think if that question arose in Lowell, we should say that the school was a common nuisance, and under the local laws of the board of health we would have power to close that school. When contagious disease comes into a school, it is a nuisance and can be abated as any other nuisance can be. Of course, I may not be right, but that is the view I should take of it. It is a cause of nuisance, and as the statutes require a nuisance to be abated, I think I am correct.

DR. WOODWARD. That question came up in Worcester last year and we went through the whole thing. Whether we had a right to close the school or not was pretty doubtful. We found that under the statutes the school buildings were under the direction of the district police. Possibly under the general law of the board of health we might have closed the schools. What we did was to send a communication from the board of health to the school committee, saying that we considered the Dix street school a source of danger to the community, and immediately the school board passed an order directing the

superintendent of schools to close any schoolhouse upon the recommendation of our board of health.

MR. CAREY. Mr. President, in Brockton we had a little experience of that kind two years ago. It was nearly vacation time, and the school committee requested us to close two of the schools; the request came from them. We had only a little while longer before the vacation, and we ordered the schools closed by their request. Of course, the attendance of the school had fallen off very largely. Referring to the matter of the Association meeting in different cities, I think when Brockton gets in shape to have the Association visit there, we shall be very glad to have them come there. We are just commencing, as the President has said, on an important work, and hope to make a success of it, and we want to get in shape to show the Association something that they would be glad to see. We shall certainly be very glad to have them meet with us.

THE PRESIDENT. I will appoint as members of the committee which you have constituted, Drs. Clark, Fox and Sawyer.

There being no further business to come before the Association the meeting adjourned.

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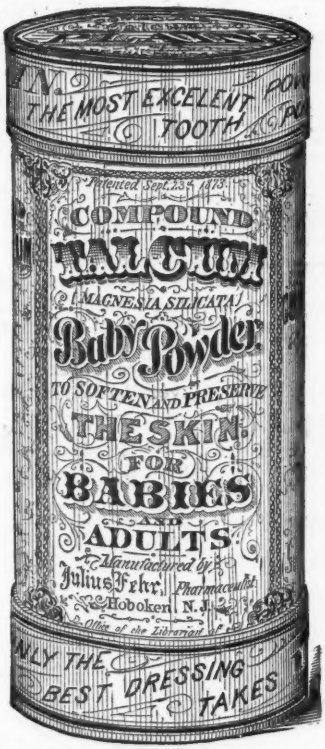

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EXAMINATION OF SPRING WATERS.

In view of the general anxiety of the public to secure pure water for drinking purposes, the following extracts from the Report of the State Board of Health for 1891 will be found particularly interesting. The Report says:

"There is a large quantity of spring water sold throughout the state, particularly in cities and towns where the regular water supply is thought to be unsatisfactory, or where the water, as is not infrequently the case with surface water supplies in the summer time, has an unpleasant taste and odor.

"A considerable number of these spring waters were collected for examination during the summer of 1891, and at the same time a careful inspection of the surroundings of the springs was made, to discover possible sources of pollution. Not only is there a large sale of spring waters as such, but there is also a large amount consumed in bottle form, as soda water and other effervescing drinks.

"As the result of this investigation, it was found that some of the springs were situated in regions nearly or quite free from population, where the land was not under cultivation, and the chemical examinations of these waters showed them to be of the highest purity. Other springs were situated in populous districts, or had near them direct sources of pollution, and the water gave evidence, on chemical analysis, that it had, in its course, received a large amount of drainage from sinks, cesspools, privies or stables. In most of the springs of this character which were examined the water showed, however, a high degree of purification by filtration through the ground.

"Normal waters have been defined to be those which have not received any waste products of human life. They are, as a rule, confined to the water-sheds with population. Any access of chlorine above the normal of the region in which the water is found is a measure of the amount of waste products, human and animal, that the water has taken up. But the evidence of contamination based on the chlorine alone does not tell us whether the source of pollution is near by or remote. This information is obtained from the determination of the nitrogen, which, in freshly polluted water, is present in the form of organic matter (albuminoid ammonia) and free ammonia, while in water which has percolated under favorable conditions through porous ground the nitrogen is all oxidized and appears in the form of nitrates.

"It is easily possible for a spring water which has somewhere in its course received a large amount of polluted drainage to be organically much purer than another in which the amount of contamination has been much less. The purifying power of porous ground, in which organic matter is exposed to bacterial action, with access of air, is sufficiently great, under favorable conditions, to convert completely organic into mineral matter, as far as chemical analysis can indicate.

"In the process of filtration through porous ground, whereby organic matter in water is oxidized, there may also be effected a purification as regards disease germs. This latter and most important purification may be due to the removal of the germs by the mechanical straining of the water at an extremely slow rate through the ground, or to the death of the germs, owing to unfavorable conditions for their life in the filtering process. While we cannot always know in any particular case which of these processes may have been the principal factor in the purification of the water, we know that the conditions of perfect mechanical filtration (whereby all suspended matters are removed from the waters), and the conditions of perfect chemical purification, are those also most favorable for the complete removal of bacteria.

"Although water badly contaminated with sewage or the wastes of human life may be purified by thorough filtration so as to be free from organic matters and from bacteria, yet in cases of ground waters of this origin and character we seldom feel complete security that the conditions of perfect filtration will always exist. A long-continued rainfall, for instance, may result in more rapid filtration and consequently less perfect purification; or the creation of new sources of contamination, nearer the spring, may result in its dangerous pollution.

"It is for such reasons that a certain suspicion always attaches to ground waters which have at any time in their history been seriously polluted. The use of ground waters, whether springs or wells, in built-up communities, should therefore be avoided, for we have no control over the conditions of filtration, and have no means of knowing (except by constant vigilance in the examination of the water) when a water hitherto well purified may become injuriously impure. The danger from the use of ground waters in populous regions increases with the increase of population, and with the nearness of the sources of pollution to the spring or well.

"We may often find a large number of harmless bacteria which have come from the air or from dust, and which would not be found in the water if better protected. A favorable construction is, of course, to be put on the low numbers of bacteria, since they show that few bacteria of any kind are present and that the conditions under which the water is filtered in the ground are favorable to its purification."

The Massachusetts Association of Boards of Health

WAS ORGANIZED in Boston, Mass., on March 19, 1890, with the following objects: The advancement of sanitary science in the State of Massachusetts; the promotion of better organization and co-operation in the local Boards of Health; the uniform enforcement of sanitary laws and regulations, and the establishment of pleasant social relations among the members of the Association.

All persons holding appointments as members of a Board of Health in a Massachusetts city or town, the executive officers of such a local board, and the members of the State Board of Health, and such other persons as may be elected, are eligible to membership. The annual dues are three dollars.

This Association has four regular meetings each year, the annual or January meeting always being held at Boston.

THE JOURNAL

OF THE

Massachusetts Association of Boards of Health

IS A QUARTERLY PUBLICATION, containing the papers read at the meetings, together with verbatim reports of the discussion. It will also contain from time to time interesting contributions from writers of the highest standing in their profession. It affords a convenient medium for the interchange of information and experience between its members, who are so widely separated as to find frequent meetings an impossibility. Every addition to its subscription list, therefore, is a material aid in extending its sphere of usefulness. All members of the Association receive the JOURNAL in return for their annual dues; to all others the subscription is one dollar per annum, in advance. If upon inspection of the accompanying copy you feel so inclined, we should be glad to receive your subscription. The JOURNAL will also be sent to the principal Hospitals, School Boards, Doctors, Architects and Boards of Health.

The publishers of this journal will endeavor to place before its readers the advertisements of reliable firms dealing in Sanitary Goods and Apparatus, Spring Waters, and articles needed by Schools, Hospitals, Architects and Physicians. It is hoped that they may receive a share of the patronage of those who may require anything in their different lines.

Address,

F. P. CHAMBERLAIN,

39 OLIVER STREET, BOSTON.

Belle of Nelson Distillery Co.

Office: New Hope, Nelson Co., Ky.

Main Office: 123 & 125 EAST MAIN STREET.

LOUISVILLE, KY., January 1, 1889.

The letter below is published for the information of Druggists who sell alcoholic liquors. Dr. D. W. YANDELL, eminent as a Surgeon and Physician, not only in the United States, but in other countries, recently addressed the letter, of which the following is a copy, to a medical friend in Philadelphia. The letter tell its own story:

LOUISVILLE, KY., Dec. 1, 1885.

MY DEAR DOCTOR:

In answer to the enquiry as to the comparative value of brandy and whiskey in therapeutics, I have briefly this to say: After a long and very careful comparison, at the bedside, of the effects of the best Cognac brandy and the best Kentucky whiskey, I am satisfied that the action of the latter is as speedy, pleasant and enduring as that of the former. There are, as you already know, many fine whiskies manufactured in this state under different brands. Among them I may name the BELLE OF NELSON, as being thoroughly well made, honest, straight and mellow, and for these reasons being specially fitted as a remedy where alcohol is indicated.

Always faithfully yours,

D. W. YANDELL.

For the information of the trade generally we append a copy of a letter from Captain Theodore C. Tracie, who was for ten years connected with the U. S. Internal Revenue Service, and was thoroughly familiar with the methods of distillation pursued in Kentucky and elsewhere. In his capacity of U. S. Int. Rev. Agent, in charge of the Division of Kentucky and Tennessee, he made frequent examinations of distilleries, and the statement made by him is entitled to high consideration:

LOUISVILLE, KY., January 1, 1886.

Mr. Robert J. Tilford, Pres. Belle of Nelson Distillery Co.

DEAR SIR: For several years it was my duty as Internal Revenue Agent to examine the Distilleries in Kentucky, and other States. As I reported, a few years ago, after making a careful examination of the methods pursued in the distillation of the BELLE of NELSON Whiskey, I found the article to be literally a pure hand-made Sour Mash Whiskey—every stage of the process being similar to the old-time method—no large tubs, patent rakes, yeast, or cold slop being used, fermentation being produced by natural and unaided causes. The proportion of rye and malt to corn used in the formula was about 33 per cent., which made the product very expensive, but it produced a whiskey which is all you represent it in purity, smoothness, and incomparable flavor, having no superior in the state. I can heartily endorse the high encomiums which have been passed upon this well-known whiskey for many years.

Yours truly,

THEODORE C. TRACIE,
Late U. S. Int. Rev. Agt.

We are also direct handlers of the following goods, bottled at the distilleries:

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J. H. CUTTER	GIBSON'S	EARLY TIMES

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